PROJECT K.T.A.P.E.: Kinesiology Tape for Athlete Performance

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Abstract

Kinesiology Tape (KT) is used to prevent or rehabilitate sports injuries, as well as to enhance an athlete's performance. The primary aim of this study was to examine differences between athletes who use KT and athletes who do not use KT using an extended Theory of Planned Behaviour (TPB) framework that included autonomous and controlled motivation for KT use. The secondary aims of this study were to (a) determine if KT is prevalent among competitive/recreational athletes, and (b) identify the reasons why athletes report using KT. Data was collected from a purposive sample of competitive/recreational athletes, using non-experimental (cross-sectional) design. Participants (n = 127) completed a questionnaire modified to fit the aims of this study using a secure online interface (www.surveymonkey.com). Multivariate Analyses of Variance indicated that athletes who used KT in the past 12 months reported higher subjective norms, perceived behavioural control, attitudes, intentions and autonomous motives, than athletes who did not use KT. Approximately half of the sample (49.6%) reported using KT in the past 12 months, and 'rehabilitation' was the main reason KT was used. Overall, the results of this study suggest a greater understanding of the psychological variables that may influence an athlete to use KT in sport. The results of this study support the use of the extended TPB in the context of understanding an athletes KT behaviours.

Keywords: Theory of Planned Behaviour, treatment/training modalities, autonomous/controlled motives

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Introduction

Injuries

Between 2010 and 2011, it was estimated that 4.7 million Canadians suffered an injury and 35% of those injuries occurred during sport or exercise (Billette & Janz, 2011; Brunswick & Scotia, 2015). In the National Collegiate Athletic Association (NCAA), there was a total of 72,316 injuries from the 1988/1989 season to the 2003/2004 season (Hootman, Dick, & Agel, 2007). The most common injury amongst both NCAA athletes and Canadians were injuries to the lower extremities (50%). Sprains and strains accounted for 51% of those injuries sustained, followed by broken bones at 17% (Billette & Janz, 2011; Brunswick & Scotia, 2015; Hootman et al., 2007). The harshness of the injuries ranged from mild sprains and strains of muscles and ligaments, to severe head injuries with lasting consequences (Billette & Janz, 2011; Hootman et al., 2007). In males, the sport with the highest injury rate was football, and soccer was the highest injury for females (Hootman et al., 2007).

Injuries happen to various individuals including athletes who play at a professional level of sport. For instance, Sami Khedira is a professional soccer player who is currently playing for Juventus FC, as well as for Germany at the international level ("Sami Khedira," n.d.). Khedira has had multiple injuries since the beginning of his career including: concussion, back injury, various muscle injuries, heel bone injury, ankle ligament problems, and most recently, a tear in the abductor muscle ("Sami Khedira," n.d.). Another athlete who has suffered multiple injuries is international beach volleyball player Kerri Walsh Jennings (Wire, 2015). Jennings has currently had four shoulder surgeries in the course of her career and two shoulder dislocations in the span of two

months in 2015 (Wire, 2015). Both Khedira and Jennings have overcome injuries to become the players they are, but not without proper rehabilitation and treatment of those injuries.

Rehabilitation Treatments

In 2000-2001, 64% of people who had a severe injury sought treatment within 48 hours of onset of the injury (Park & Wilkins, 2004). Half of those seeking treatment went to a hospital emergency room, and one-fifth of those went to a doctor's office (Park & Wilkins, 2004). The severity of the injury can determine where the individual seeks treatment, but as Park and Wilkins (2004) state, half of the injured population seek treatment in a hospital emergency room before being referred to other specialists. For severe musculoskeletal injuries such as sprains and strains, individuals may be referred to a specialist, such as a physiotherapist (Wexler, 1988). Physiotherapy aims to restore optimal physical functioning, most appropriate for individuals with pain, limited range of motion, impaired muscle functioning, or decreased fitness (Fransen, 2004). Physiotherapists use a wide range of treatments such as manual therapy, electrophysical agents, and exercise (Fransen, 2004). One option of treatment that has been gaining popularity among rehabilitation professionals to treat a wide range of musculoskeletal injuries is Kinesiology Tape (KT) (Nunes et al., 2015; Taradaj, 2015).

Kinesiology Tape: What is it?

KT was developed in the 1970's by a Japanese chiropractor named Dr. Kenzo Kase (Gibbons, 2014; Hosp et al., 2015; Kahanov, 2007). It consists of tightly woven elastic fibres, which can be stretched to approximately 120% of their original size to mimic the elasticity of human skin (Coker, 2012; Csapo & Alegre, 2015; Taradaj, 2015). The

proposed benefits of KT include: normalization of muscular function, increased vascular and lymphatic flow, reduced pain by neurological suppression, corrected joint misalignment, relieved abnormal muscle tension, and increased proprioception (Cai, Au, An, & Cheung, 2015; Coker, 2012; Gibbons, 2014; Hosp et al., 2015; Kahanov, 2007; S. Lee & Lee, 2015; Taradaj, 2015). KT can be used safely and with minimal side effects on any individual including children and the elderly, who have suffered a musculoskeletal injury (Coker, 2012; Kahanov, 2007)

Popularity of KT increased following the 2008 Summer Olympics in Beijing where USA beach volleyball gold medalist Kerri Walsh Jennings appeared wearing the tape on her shoulder (Csapo & Alegre, 2015). Since 2008 the use of KT has increased, despite conflicting evidence of its effectiveness (Morris, Jones, Ryan, & Ryan, 2013). A case study by S. Lee and Lee (2015), found that KT was effective in decreasing the pain in a 43-year-old male with metacarpophalangeal joint hyper extension injury (MCP). After a step-wise treatment of KT was administered, the patient was able to power grip, precision pinch, turn a key and hold a pen without pain (S. Lee & Lee, 2015). Likewise, a study examining chronic ankle instability in university students found that sensory organization test scores improved in the students after the use of KT when performing various balancing tasks (De-La-Torre-Domingo, Alguacil-Diego, Molina-Rueda, Lopez-Roman, & Fernandez-Carnero, 2015).

B. Lee and Lee (2015) tested nine male soccer players with functional ankle instability, and provided a specific type of ankle balance taping (ABT) using KT, no KT and a placebo. They concluded that the specific ABT method used to apply the KT may

provide greater ankle joint stability that may assist with ankle sprains (B. Lee & Lee, 2015).

Similarly, an abundance of research has provided evidence that KT is ineffective in a variety of populations and conditions. These researchers have measured numerous aspects of the tape's proposed functions on healthy participants, including muscle performance and flexibility, stability, pain, as well as knee and ankle proprioception (Laborie et al., 2015; De-La-Torre-Domingo et al., 2015; Kodesh & Dar, 2015). Other research have looked at individuals with more serious injuries such as chronic ankle instability, as well as anterior cruciate ligament (ACL) surgery and shoulder pain (De-La-Torre-Domingo et al., 2015; Niven, Nevill, Sayers, & Cullen, 2012; Parreira et al., 2014). The common finding of these studies is the ineffectiveness of KT in what it is proposed to do for an individual. A study by Poon et al. (2015) tested the muscle performance of 30 healthy participants using true KT, sham KT and no KT. After testing peak torque, total work, and time to peak torque in the healthy participants, they concluded that KT was not effective in increasing muscle performance (Poon et al., 2015). In fact, they found that previously reported muscle facilitatory effects using KT could be attributed to placebo effects (Poon et al., 2015).

Two studies looked at the effect of KT on individuals with chronic pain. The first study looked at individuals who were recovering from ACL surgery and either had KT placed on them after surgery or no KT at all (Laborie et al., 2015). It was established that the group wearing the KT after ACL surgery had the same amount of pain as the individuals in the control group (Laborie et al., 2015). Similarly, Devereaux et al. (2016) compared the effectiveness of KT to a non-steroidal anti-inflammatory drug (NSAID) to

an adjuvant treatment of exercise in a group of individuals with shoulder pain. They found that pain and function improved in all three of the groups tested (KT and exercise, NSAIDs and exercise, exercise only), but there was no statistically significant or clinically meaningful differences between the three groups (Devereaux et al., 2016). Therefore, amongst injured populations who are suffering chronic pain, KT is no more effective than other treatment modalities such as NSAIDS and exercise to manage pain.

Additionally, a study testing for ankle proprioception and stability examined individuals with chronic ankle instability and they were tested in three conditions: KT, sham KT, and no KT (Kodesh & Dar, 2015). Kodesh and Dar (2015) demonstrated that the KT had no effect on balance performance, as well as no improvement in proprioception in the ankle of the participants (Kodesh & Dar, 2015). Likewise, a study by Hosp et al. (2015) tested healthy individuals for knee proprioception by walking up-hill on a treadmill and concluded that there was no significant difference of proprioceptive performance between the KT and no KT groups (Hosp et al., 2015). Therefore, each of these studies that tested healthy individuals for proprioception of the knee and ankle had results that supported the ineffectiveness of KT to increase proprioception.

Lastly, when KT was tested in a variety of studies for muscle performance, including strength, flexibility and muscle activity, it was demonstrated that KT was not effective in improving muscle performance. Healthy individuals participated in each of the studies that examined the ineffectiveness of KT on muscle performance. Three studies used individuals who were without knowledge of KT and had three conditions including KT, no KT and a form of sham taping (Cai et al., 2015; Cheung et al., 2015;

Poon et al., 2015). One such study concluded that KT did not facilitate or inhibit muscle activity or change functional performance in healthy adults (Cai et al., 2015). Similarly, Cheung et al. (2015) concluded that KT did not improve jumping performance in healthy, experienced volleyball players. The third study also provided evidence suggesting that KT did not improve muscle torque, muscle work or time to peak torque in their participants (Poon et al., 2015). The third study by Poon et al. (2015) also noted that the previous successful findings in other articles may be attributed to the placebo effect, since participants were ignorant to KT. Each of these studies demonstrates that in healthy individuals who were ignorant to KT, there were no improvements in muscle performance (Cai et al., 2015; Cheung et al., 2015).

Athletes and Recovery or Therapeutic Modalities

Previous literature explored the effectiveness of using KT on chronic and healthy individuals. However, the literature does not examine prevalence rates, or the popularity of KT among athletes using the modality. Various recovery modalities have been used by athletes of all levels including NSAIDs. In fact, one in four athletes drug tested at the Sydney 2000 Olympic Games declared the use of an NSAID (Mottram & Chester, 2015). Reports of prevalence rates of NSAID use in athletes indicates that they are the most commonly used class of medication by athletes (Mottram & Chester, 2015). Alaranta, Alaranta, Heliövaara, Airaksinen, and Helenius (2006) examined the use of physician-prescribed medication in elite athletes compared to the general population. They found that 49.10% of athletes had used NSAIDs in the past 12 months, specifically athletes in speed and power events used NSAIDs most frequently (59.30%). Although NSAIDs seem to be popular among athletes, Mehallo, Drezner, and Bytomski (2006) caution the

use of NSAIDs as they are not recommended for all injuries, and duration of treatment using NSAIDs should be kept short. A study by Krause, Dust, Banzer and Vogt (2017) examined prevalence rates and subjectively-perceived effects of Kinesiotape in exercise science students in a German university. They found that two-thirds (67.00%) of the sample reported using KT (Krause et al., 2017). As well, they examined the reasons why their sample used KT and found that KT was used primarily for therapy (Krause et al., 2017). Therefore, the current study addressed prevalence rates as well as reasons for use of KT among athletes.

A therapeutic modality such as KT could be used for injury rehabilitation, injury prevention or sport performance aid (Montalvo, Cara, & Myer, 2014). However, there is currently a lack of research discussing which of these options that KT is used for the most in athletes. Knowledge of why athletes decide to use a specific modality is important to health professionals and athletes who are trying to recover from injury or trying to enhance their performance. Lindsay, Dearness, Richardson, Chapman, and Cuskelly (1990) examined how often physiotherapists use modalities within their practice. They determined that of all physiotherapists who responded (70.00% of the sample) reported to use ultrasound most frequently as a part of their treatment regimens (Lindsay et al., 1990). Ultrasound is primarily used for treatment purposes, often to aid in the recovery of musculoskeletal injuries or disorders (Gam & Johannsen, 1995; Van Der Windt et al., 1999). Similar to these outcomes, the study by Krause et al. (2017) also discovered that 81.00% of the participants were recommended to use KT by a physiotherapist. However, determining the main reason why athletes use KT would be useful for health professionals working with athletes.

Theory of Planned Behaviour

Theories provide frameworks to interpret information and uncover the deeper meanings of actions of individuals. The Theory of Planned Behaviour (TPB; Ajzen, 1991) was used to reveal specific psychological predictors that athletes may or may not have towards Kinesiology Tape. The TPB was developed in 1991 by Icek Ajzen and derived from the Theory of Reasoned Action (Ajzen, 2002). The TPB proposes that intentions to engage in a behaviour are influenced by attitude toward the behaviour, subjective norms and perceived behavioural control (Ajzen, 2002; Niven et al., 2012). As a general rule for the TPB, the more favorable the attitude, subjective norm and perceived behavioural control, the stronger the intention is to perform a behaviour (Ajzen, 1991). Comparatively, the lower the attitude, subjective norm and perceived behaviour control, the less likely the intention is to perform a behaviour. Intention to perform the behaviour captures the motivational factors that influence a behaviour; therefore the stronger the intention to engage in a behaviour, the more likely the behaviour should be performed (Ajzen, 1991).

Independent determinants of intention include attitudes, subjective norms and perceived behavioural control. Attitudes refer to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question (Ajzen, 1991). Attitudes are the beliefs about the likely consequences or other attributes of the behaviour, which then produces a favourable or unfavourable attitude toward the behaviour (Ajzen, 2002). Subjective norms refer to the perceived social pressure to perform or not to perform the behaviour (Ajzen, 1991). This includes the beliefs about the normative expectations that other individuals have towards the behaviour, resulting in

social pressure (Ajzen, 2002). Lastly is perceived behaviour control, which refers to the perceived ease or difficulty of performing the behaviour and is assumed to reflect past experience as well as anticipated impediments and obstacles (Ajzen, 1991). Perceived behavioural control was added to the TRA to become the TPB to deal with situations in which people may lack complete volitional control over the behaviour of interest (Ajzen, 2002).

Intention is the most central factor in the TPB and as a general rule, the stronger the intention to engage in a behaviour, the more likely the individual will be to perform the behaviour (Ajzen, 1991). It was found by Ajzen (1991), that in general, behaviours can be predicted from intention with great accuracy when they pose no serious problem of control. Therefore, when problems of control arise, the three independent determinants predict intention. In a study testing rehabilitation intention and adherence following ACL surgery, it was found that participants scored high on the TPB constructs and exhibited a strong intention to adhere to the program (Niven et al., 2012). Niven et al. (2012) also found that a positive attitude toward the rehabilitation, perceptions of support from significant others, and perceptions of control over the rehabilitation, increased the intention of adherence to the program.

Criticisms of The Theory of Planned Behaviour

The two major criticisms presented by Sniehotta, Presseau, and Araújo-Soares (2014) surround issues of validity and utility regarding the TPB. The criticism of validity outlined by Sniehotta et al. (2014) claims that the TPB does not explain sufficient variability in behaviour and that mediation assumptions in TPB are in conflict with evidence, such as the suggestion that beliefs predict behaviours over and above intentions

(Sniehotta et al., 2014). Sniehotta et al. (2014) also claim that the TPB works best with individuals who are young, fit, affluent and those who self-report their behaviour, which in the opinion of Sniehotta et al. (2014), is not the target group that needs to be assessed for behaviour change. Also, McEachan, Conner, Taylor, and Lawton (2011) state that behaviours assessed in shorter term and that are self-reported were better predicted using the TPB. Lastly, Sniehotta et al. (2014) state that various other measures such as habit strength, motivational measures or self-regulatory measures predict behaviour to a greater extent than the measures in the TPB.

The second major criticism outlined by Sniehotta et al. (2014) is the utility of the TPB. They suggest that the TPB does not work with experimental tests, or provide an explanatory hypotheses that would differ in a meaningful way from other prevalent theories (Sniehotta et al., 2014; Sutton, 2002). Weinstein (2007) claims that TPB expresses little information about the causal factors underlying health behaviours. Sniehotta et al. (2014) states that scientists have moved on and have started to use an extended form of the TPB. Through the increased use of the extended form of TPB, it is believed that the original TPB is not an acceptable explanation for human behaviour (Sniehotta et al., 2014).

However, not everyone has the same opinion as Sniehotta et al. (2014). Rhodes (2014) for example, believes that the extended forms of the TPB are alive and well used amongst scientists in the health behaviour field. Rhodes (2014) suggests that the TPB does not stand alone, as the problems for TPB are similar to other theories of cognitive tradition, such as the Health Behaviour Theories (HBTs). His article also suggests that the core components of the TPB have some support, including intention, which mediates

considerable relationships between antecedent constructs and is a good predictor of behaviour (Rhodes, 2014). Rhodes (2014) supports the testing of the extended form of TPB including concepts such as dynamic change, automatic/habituated responses and behavioural regulation strategies.

Applications of TPB: Rehabilitation Settings

The TPB has been used in a variety of settings when attempting to predict human behaviour change. There is currently a lack of evidence using the TPB as a guiding framework when determining KT behaviour. KT is primarily used in a sport, recreational, and/or rehabilitation settings, therefore studies who have used the TPB in a rehabilitation setting was used to support the use of TPB as a guiding framework in KT behaviour. A cross-sectional study was conducted to examine how motivational regulations from the Self Determination Theory (SDT; Deci & Ryan, 2008) influenced athletes intentions towards sport-injury rehabilitation and prevention behaviour, using the TPB as a guiding framework (Chan & Hagger, 2012b). They measured autonomous motivation, controlled motivation, attitude, subjective norms, perceived behaviour control and intention in elite athletes (Chan & Hagger, 2012b). They indicated that attitudes, subjective norms, and perceived behaviour control in elite athletes positively predicted intentions of injury rehabilitation and prevention (Chan & Hagger, 2012b). In relation to KT, according to Chan and Hagger (2012b), elite athlete's attitudes towards KT, the subjective norm surrounding KT and perceived control over the use of KT can positively predict an athlete's intention to use KT.

Additionally, a study tested the usefulness of the TPB in predicting exercise intention and adherence in patients undergoing cardiac rehabilitation (Blanchard et al.,

2003). One important finding of this study was that intention was the sole determinant of exercise adherence in cardiac rehabilitation patients (Blanchard et al., 2003). Another important finding was that attitude towards perceived behaviour control determined intention to exercise (Blanchard et al., 2003). The findings of this study by Blanchard et al. (2003) support the TPB in a rehabilitation setting, which could be related to the use of KT, including determining an athlete's intention to use or not use KT. However, extended TPB has yet to be fully tested in a rehabilitation setting using diverse samples and rehabilitation issues where the theory may be useful as a framework for explanation.

Why Use the Theory of Planned Behaviour?

TPB proper is the original form of the TPB created by Icek Ajzen and refers to how attitudes, subjective norms and perceived behaviour control influence an individual's intention to perform a behaviour (Ajzen, 1985). As research has developed over the years, an extended form of the TPB has emerged in the health behaviour field. The researchers using the extended TPB suggests the addition of constructs such as belief salience measures, past behaviour/habit, perceived behaviour control vs. self-efficacy, moral norms, self-identity and affective beliefs (Conner & Armitage, 1998). TPB extended attempts to further the understanding of attitudes and behaviours of individuals in the health behaviour field (Conner & Armitage, 1998). Supported by Rhodes' (2014) article, the TPB extended should continue to be tested and expanded upon in the health behaviour field.

One construct that was added to the current study to the TPB extended is past behaviour and habit, which was observed by Conner and Armitage (1998). It is argued that many behaviours are determined by one’s past behaviour rather than by cognitions

such as attitudes, subjective norms and perceived behaviour control (Conner & Armitage, 1998). Researchers examined exercise behaviour among adults of a general population, researchers found that habit was the most important predictor of exercise behaviour (Godin, Valois, & Lapage, 1993). Ajzen (1991) argued that the effects of habit should be mediated by perceived behaviour control. However, Conner and Armitage (1998) looked at various studies that examined past behaviours on TPB constructs and found that past behaviour contributed to the predictions of intentions and behaviour once the TPB variables were considered. Therefore, it is important to the current study to include past behaviours as a possible predictor of intention to use KT when an athlete is injured.

Motivation is an additional construct that was included with the TPB in the current study and was examined at by Chan, Hagger, and Spray (2011). Chan and Hagger (2012a) separate motivation into two different forms, autonomous and controlled motivation. Autonomous motivation refers to motivation that is underpinned by a desire to obtain benefits that are highly valued (Chan, Lonsdale, Ho, Yung, & Chan, 2009). Controlled motivation refers to behaviours that are the result of external or internal pressure (Chan et al., 2009). An article by Chan and Hagger (2012a) integrated the TPB and SDT to test if autonomous and controlled motivation would form positive and negative relationships with intention for sport injury rehabilitation (Chan & Hagger, 2012a). They found that autonomous and controlled motivation were positively associated with the constructs of TPB in a sport rehabilitation setting (Chan & Hagger, 2012a). Therefore, for the current study it is important to include autonomous and controlled forms of motivation as possible predictors of intention to use KT.

Various articles in the health behaviour literature have supported the use of the extended form of the TPB. One article tested the belief-based components of TPB proper that underpin the attitude, subjective norm and perceived behaviour control (Chan et al., 2015). Researchers found that the beliefs underlying the direct measures of TPB were successful in forming positive associations with their corresponding social cognitive constructs (Chan et al., 2015). Additionally, another study using TPB extended added risk perception to the model to determine safe-food handling in adolescents (Mullan, Wong, & Kothe, 2013). This study supported the utility of TPB in predicting safe food handling, and the addition of risk perception added to the predictive utility of the TPB (Mullan et al., 2013).

The extended form of TPB has also been used in the rehabilitation literature. A recent study testing for intention to use sport concussion guidelines in coaches and sports trainers used the extended TPB and included personal norms as another predictor (Newton et al., 2014). Newton et al. (2014) identified that self-efficacy and personal norms positively predicted intention to perform a behaviour. Likewise, an article focusing on exercise during long distance flight travel added the variable of descriptive norm and self-identity to the TPB (Leyland, van Wersch, & Woodhouse, 2014). They found that the extended form of TPB including descriptive norm and self-identity was successful in determining intention to perform walking and seated in-flight exercise (Leyland et al., 2014). Both Newton et al. (2014) and Leyland et al. (2014) found that the addition of constructs to the original TPB increased the utility of the theory.

Study Purpose and Hypotheses

To address the study purpose, the following two questions and hypotheses drawn from the work of Ajzen (1991) and Rhodes (2014) was examined:

(a) Is there a difference in TPB predictors between athletes who use KT and the athletes who do not use KT?

(b) Is there a difference in TPB extended predictors between athletes who use KT and the athletes who do not use KT?

To address this question, it is hypothesized that higher attitudes, subjective norms, perceived behaviour control and intentions for KT use was reported by athletes who previously used KT, versus those who report never using KT. The work of Rhodes (2014) adds another variable to the TPB to increase the utility of the theory in a sports setting. The current study adds the variables of past experience as well as autonomous/controlled motivation to the TPB to further examine athletes behaviours of KT (Chan et al., 2015; Newton et al., 2014; Leyland et al., 2014). Therefore, it is also hypothesized that athletes who have used KT will report higher autonomous and controlled motivation, than individuals who have never used KT.

Two secondary purposes of this study are exploratory based and consist of the following two questions:

(a) What is the prevalence of KT among recreational/competitive athletes?

(b) What is the primary purpose of using KT among athletes?

Since these two secondary purposes are exploratory in nature, there was a lack of evidence supporting these questions, therefore no hypotheses were generated.

Methods

Participants

Purposive sampling recruited two groups for this study. Group 1 (n = 64) included athletes who have never used KT and Group 2 (n = 63) was comprised of athletes who reported using KT in the past 12 months. The inclusion/exclusion criteria for this study were as follows: (a) athletes were 17 years of age and above, (b) involved in competitive and/or recreational athletics in the past 12 months (DiClemente & Prochaska, 1998), (c) able to read and write in English, and (d) provided consent to participate in Project K.T.A.P.E.

Design

This study used a two-group, case-control study design. The two groups were athletes who have used KT and athletes who have not used KT.

Instruments

The full questionnaire for this study can be found in Appendix A.

Demographics

Participants responded to a series of items pertaining to demographic composition of the two groups that was obtained through self-report questions. These items included an assessment of age, sex, ethnicity and level of sport participation. In regards to ethnicity, the latest version of the census from Statistics Canada (2011) gave the following options as ethnicities that individuals could identify with: White, South Asian, Chinese, Black, Filipino, Arab, Korean, Latin American, West Asian, Japanese, Aboriginal, Southeast Asian, and Other (Statistics Canada, 2011).

Sport Participation and KT History

Sport level was assessed with the following question: What level of sport have you played in the last 12 months? Two answers were provided as options: (a) recreational or (b) competitive (Anderson & Keene, 2008; Gordon, 2015). With regards to measuring KT use and frequency, a study by Venter, Potgieter, and Barnard (2010) was used as the basis for this question. This research included a questionnaire measuring frequency and type of recovery modalities used in South African athletes at different levels of participation (Venter et al., 2010). A sample of a question regarding frequency of KT use is as follows: How often have you used KT for a sports injury? With the following possible responses: Never, Rarely, Sometimes, Often, Always (Venter et al., 2010).

Theory of Planned Behaviour Constructs

Attitudes were measured using six pairs of synonyms affixed on a seven-point scale ranging from one (strongly agree), four (neutral) and seven (strongly disagree) modified form the work of Chan and Hagger (2012b). The full complement of items assessing attitudes is presented in Appendix A.

Subjective norms was measured on a seven-point scale ranging from one (strongly agree), four (neutral) and seven (strongly disagree) based on work by Chan and Hagger (2012b). The items assessing subjective norms included: (a) most people who are important to me think that I should use KT when I get injured, (b) it is expected of me that I use KT when I get injured, and (c) the people in my life whose opinions I value would approve of wearing KT when I get injured (Chan & Hagger, 2012b).

Perceived behavioural control was measured using a seven-point scale drawn from the work of Chan and Hagger (2012b). Responses to each item ranged from one (strongly agree), four (neutral) and seven (strongly disagree). These items included the following: (a) it is possible for me to follow the recommendations to use KT when I get injured, (b) if I want to I could use KT when I get injured, (c) I have complete control over my use of KT when I get injured, (d) it is mostly up to me whether or not I use KT when I get injured, and (e) it is easy for me to use KT when I get injured (Chan & Hagger, 2012b).

Intentions were measured on a seven-point scale drawn from the work of Chan and Hagger (2012b). Responses to each item ranged from one (strongly agree), four (neutral), and seven (strongly disagree). The following items measured intention: (a) I intend to use KT when I get injured, (b) I will try to put effort in using KT when I get injured, and (c) I plan to engage in KT use when I get injured (Chan & Hagger, 2012b).

Extended Theory of Planned Behaviour Constructs

Two different types of motives for KT use were assessed in this study. Controlled motivation was measured using a seven point scale ranging from one (not at all true), four (somewhat true), seven (very true) based on work by Chan et al. (2011). Sample items measuring controlled motivation in this study included: 'I have decided to use KT when I am injured because I would have felt bad about myself if I didn't' and 'I have decided to use KT when I am injured because others would have been angry with me if I didn't' (Chan et al., 2011). Autonomous motivation was measured using a seven point scale ranging from one (not at all true), four (somewhat true), seven (very true) based on work by Chan et al. (2011). Sample items measuring autonomous motivation in this study

included: 'I have decided to use KT when I am injured because I feel like it's the best way to help myself' and 'I have followed the recommendations to use KT when I am injured because it is important to me that my efforts succeed' (Chan et al., 2011).

The last construct measured was participants past behaviour with KT. Sample item for measuring past behaviour included: 'How often have you used KT after suffering an injury in the last 12 months?' It was measured on a six-point scale, responses to each item ranged from: one (never), two (less than once a month), three (about once a month), four (about two or three times a month), five (about one or two times a week), and six (at least three times a week).

Data Collection Procedures

Data was collected via an electronic interface hosted on a secure internet site (www.surveymonkey.com). Study promotion used a multi-factorial strategy to advertise and recruit competitive and recreational athletes at Brock University through the use of verbal presentations (see Appendix C), postings (see Appendix B, F & G), and electronic scripts (see Appendix D & E). A rolling recruitment format was employed to enroll participation in this study from January 20th, 2017 to March 8th, 2017. Study promotion and recruitment efforts proceeded in steps. First, a series of emails were sent to head coaches at Brock University sent on January 20th, 2017 where they were asked to forward the email to athletes on each team they coached at the university (see Appendix E). Second, Brock University professors with the largest classes within the Department of Kinesiology were contacted on January 20th, 2017 via email and asked to display an online poster to their students using Sakai (Brock Student Center; see Appendix G), as well as allow a brief oral presentation to advertise this study during class time. All eight

professors that were contacted agreed to a presentation with five of those professors allowing an online poster to be uploaded to Sakai. All eight presentations were given between January 25th, 2017 and March 1st, 2017. Third, a posting was made on February 1st, 2017 to the Brock University Faculty of Applied Health Sciences Facebook website (facebook.com/BrockFAHS) advertising the study (see Appendix F). Snowball sampling was also employed to maximize recruitment efforts within this study.

After contact was made with a participant, the participant was taken through the following procedure: (a) each participant entered the survey via the web link provided to www.surveymonkey.com, (b) participant read the Letter of Invitation (LOI; see Appendix H) they were informed about the nature of the study and encouraged to ask questions to the investigators through email (or telephone) prior to consenting to participate, (c) each participant then provided informed consent (IC; see Appendix I) by clicking a box indicating they wished to participate before obtaining access to the questionnaire, (d) if the participant choose to consent they were directed to the questionnaire. Those who declined to provide consent were directed to the end of the survey. All aspects of this study were reviewed by the Brock Research Ethics Board prior to initiating any participant contact and data collection. The first participant accessed the survey on January 23rd, 2017 at 3:30pm, and the final participant accessed the survey on February 25th, 2017 at 10:12pm. The full data set was then downloaded from the host site www.surveymonkey.com on March 8th, 2017, by the principal investigator for subsequent data analysis.

Data Analysis

Data analyses involved testing assumptions for the Multivariate Analyses of Variance (MANOVA). These assumptions included: (a) independence, (b) absence of outliers, (c) linearity of the dependent variables, (d) homogeneity of variance were tested for the independent samples *t*-test (Tabachnick & Fidell, 2001). Cronbach's alpha (α; Cronbach, 1951) was used to estimate score reliability for the TPB proper and extended variables (Leary, 2008). Main analyses were conducted using MANOVAs to examine mean differences between groups on multiple dependent variables portrayed in the TPB and extended TPB. Use of KT was used as the independent variable.

Results

Preliminary Data Analysis

A total of 133 individuals provided informed consent to participate in this study. Non-responders were defined as those individuals who provided consent but elected not to provide responses to any of the items contained within the study questionnaire. Non-responders (n = 2) were removed from this sample. Six participants were removed because they did not provide any data for the TPB and motivation items requested in the study. The final sample size carried forward responses from 127 individuals. A detailed description of participant characteristics can be found in Table 1.

Missing data was found in the items measuring the TPB and motivation variables. Missing values analysis was run in IBM-SPSS (version 23.0) indicating that no more than 3.10% of the data was missing on any TPB item. Little's (1988) test for the TPB variables (χ^2 = 92.88, df = 113, p = 0.92) revealed that patterns of missing data in this sample were considered to be missing at random. A second missing values analysis was performed in IBM-SPSS (version 23.0) using the motivation items and revealed that no more than 3.10% of the data was missing on any motivation item. Little's (1988) test for the autonomous/controlled motivation items (χ^2 = 14.71, df = 30, p = 0.99) revealed that any patterns of missing data in this sample could be considered missing at random. An expectation maximization algorithm was used to replace the missing values to safeguard against misleading estimates stemming from missing data (Tabachnick & Fidell, 2001).

Reliability Analysis: Internal consistency

A reliability analysis was run for each of the scales measuring the TPB and measuring autonomous/controlled motives for KT use. Reliability coefficients were

estimated using Cronbach's (1951) coefficient alpha (α). Reliability estimates can be found in Table 2. The lowest reliability score was found in the subjective norm item scores (α = 0.67). The highest reliability value was found using the autonomous motivation item scores (α = 0.93). Following the reliability analysis, subscale scores were calculated for each of the TPB variables and motivation variables. This consisted of getting a mean value for each of the items that were measured in TPB and motivation questions.

Main Analysis: KT prevalence

In the survey questionnaire participants were asked, "How often have you used KT over the past twelve months?" In our sample of 127 participants, 50.40% (*n* = 64) of the sample responded that they never used KT in the past 12 months, 49.60% (*n* = 63) of the sample responded that they had used KT in the past twelve months. Of those participants who reported using KT in the past twelve months (49.60%), 20.50% reported using it less than once a month, 5.50% reported using it about once a month, 11.00% reported using it two or three times a month, 11.00% reported using it one or two times a week, and 1.60% reported using KT at least three times a week.

Main Analysis: KT use

In the survey questionnaire, participants were asked, "In the past twelve months, have you used KT for any of these reasons?" They were presented with the following options (a) Injury Prevention; (b) Injury Rehabilitation; (c) Performance Aid; and (d) Other. Of the 102 individuals who responded to this question, 16.50% (*n* = 21) reported using KT for injury prevention, 37.00% (*n* = 47) reported using KT for injury rehabilitation, 18.90% (*n* = 24) reported using KT as a performance aid, and 7.90% (*n* =

10) reported using KT for a reason other than the options provided. Additionally, the question stating "Previously, how often have you used KT for a sports injury?" was analyzed. It was found that 5.50% never used KT for a sports injury, 7.90% rarely used KT for a sports injury, 11.00% sometimes used KT for a sports injury, 17.30% used KT often for a sports injury, and 3.10% always used KT after an injury. It should be noted that the data for this question was based upon a limited number of responses (n = 57).

Main Analysis: Psychological factors linked with KT

Using the data from the question: "How often have you used KT in the last 12 months?" a new variable was created. Individuals who answered "Never" were assigned with a value of '0' (n = 64), and individuals who answered any of the other four options were assigned with a value of one (n = 63). The frequency of those answers in the group reporting using KT in the past 12 months ranged from less than once a month to at least three times per week.

Prior to analyzing group differences in KT use the statistical assumptions of MANOVA were examined within the data provided by the sample used in this study. The following assumptions were either tested or addressed with a function of the study design. The first assumption of independence was met by the study design, where a participant who indicated they have used KT was excluded from the group who have never used KT (and vice versa). Second, the data was checked for statistical outliers per MANOVA using a criterion of greater than or equal to |3.00| standard deviations from the mean score on dependent variables. There was one outlier found in this data set in the perceived behavioural control variable (z = -3.50), however this participant was not removed in subsequent analyses. Third, the assumption of linearity among the dependent

variables was tested using Bartlett's Test of Sphericity. Linearity was evident between our dependent variables (Bartlett's χ^2 = 170.57, *df* = 9.00, *p* < .01). Fourth, normality of the data was tested using the skewness and kurtosis statistics. Skewness values ranged from -1.11 to 0.17, and kurtosis values ranged from -0.82 to 1.32 in this sample indicating no grave departures in univariate normality evident in the data. The final assumption of homogeneity of variance was tested using Box's M Test of Equality. This assumption was met with a Box's M Test value of 16.47 (*F* = 1.59, *df* = 10, *p* = 0.10).

After the assumptions were analyzed a MANOVA was conducted to examine differences between groups who have used KT in the past 12 months and those who have not used KT in the past 12 months on the TPB variables. A significant multivariate effect was evident between the groups who have not used KT in the last 12 months and those who have used KT in the last 12 months on the combined dependent variables (*F* = 17.47, *p* < .01, Wilks' Lambda = 0.64 (*df* = 4,122.0), partial eta-squared = 0.36). Examination of the data revealed that the individuals who have used KT in the past 12 months reported higher means than the individuals who did not use KT in the past 12 months on subjective norms, perceived behavioural control, attitudes and intentions (means and standard deviations can be found in Table 3). All mean differences for each subscale were statistically significant (all *p*'s < .01): (a) subjective norm (partial eta-squared = 0.16); (b) perceived behaviour control (partial eta-squared = 0.13); (c) attitudes (partial eta-squared = 0.28); and (d) intentions (partial eta-squared = 0.33).

The statistical assumptions of MANOVA were examined in a second model that tested an extended TPB which included autonomous/controlled motives. The following assumptions were either tested or addressed using the study design. The first assumption

of independence was met by the study design, where a participant who indicated they have used KT excluded them from the group who have never used KT. Second, the data was checked for statistical outliers per MANOVA using a criterion of greater than or equal to |3.00| standard deviations from the mean score on dependent variables. Three outliers found in this data set, one evident on perceived behaviour control variable (z = -3.50), the second participant (z = 3.77) and the third participant (z = 4.65) were both found in the controlled motivation variable. These participants were not removed. Third, the assumption of linearity among the dependent variables were tested using Bartlett's Test of Sphericity. Linearity was evident between our dependent variables (Bartlett's χ^2 = 317.31, *df* = 20, $p < .01$), this assumption was met. Fourth, normality of the data was tested using the skewness and kurtosis statistics for this samples data. Skewness values ranged from -1.11 to 2.15, and kurtosis values ranged from -0.86 to 5.08, subsidizing no grave departures from univariate normality in the data. The final assumption of homogeneity of variance was tested using Box's M Test of Equality. This assumption was met with a Box's M Test value of 45.53 ($F = 2.06$, $df = 21.00$, $p < .01$).

MANOVA tested the differences between groups who have used KT in the past 12 months and those who have not on the extended TPB variables of subjective norm, perceived behavioural control, attitudes, intentions, autonomous/controlled motives. Frequency of KT use in the last 12 months acted as the independent variable and TPB extended variables served as the dependent variables in this MANOVA. A significant multivariate effect was apparent between the groups who have not used KT in the last 12 months and those who have used KT in the last 12 months on the combined dependent variables ($F = 12,84$, $p < .01$, Wilks' Lambda = .61 ($df = 6,120.0$), partial eta-squared =

0.39). Examination of the data revealed that the individuals who have used KT in the past 12 months scored higher means than the individuals who reported not using KT in the past 12 months on subjective norms, perceived behavioural control, attitudes, intentions and autonomous motivation (means and standard deviations can be found in Table 3). Controlled motivation was the only variable that did not have higher means in groups who reported using KT in the past 12 months compared to those who reported not using KT in the past 12 months (see Table 3). All mean differences for each subscale were statistically significant (all p's < .01): (a) subjective norm (partial eta-squared = 0.16); (b) perceived behaviour control (partial eta-squared = 0.13); (c) attitudes (partial eta-squared = 0.28); (d) intentions (partial eta-squared = 0.33); (e) autonomous motivation (partial eta-squared = 0.27); and (f) controlled motivation (partial eta-squared = 0.02).

Discussion

The main aim of this study was to determine if differences were evident between athletes who use KT and those who have not used KT in the past 12 months using variables comprised of an extended TPB framework. The secondary aims of this study were to determine the prevalence of KT among competitive/recreational athletes and to understand the reasons athletes report using KT. On the basis of previous research (Ajzen, 1991; Rhodes, 2014), it was hypothesized that athletes reporting use of KT in the past 12 months would score higher on subjective norms, attitudes, perceived behavioural control and intentions plus autonomous and controlled motives than athletes not using KT in the past year. As well, since the two secondary purposes were exploratory in nature, there were no hypotheses generated for these two questions. MANOVA results revealed that athletes who have used KT within the past year reported elevated subjective norms, greater perceived behavioural control, stronger attitudes, higher intentions and more autonomous motivation towards KT than those athletes who have not used the tape. Findings also showed that controlled motivation did not differ statistically between groups who used KT and those who never used KT in the previous 12 months. In regards to the secondary aims of this study, it was noted that 49.60% of this sample reported using KT plus athletes who have used KT in the past year cited ‘rehabilitation’ as the main purpose for employing this modality.

TPB (Extended) and KT Use

The primary purpose of this study was to determine if there were differences in TPB proper (and TPB extended) between athletes who have used KT and athletes who have not used KT in the past 12 months. Main findings of the first MANOVA testing the

TPB proper showed a significant multivariate effect between the groups who have used KT and those who have not used KT in the past 12 months. Univariate effects between groups were shown across subjective norms, perceived behavioural control, attitudes and intentions. Specifically, it was discovered that KT users in the past 12 months scored higher means on attitudes, subjective norms, perceived behavioural control and intentions compared to the individuals who reported not using KT in the last 12 months. Of the four TPB proper variables tested, partial-eta squared values ranged from intentions scoring the highest (partial eta-squared= 0.33) and perceived behavioural control scoring the lowest (partial eta-squared = 0.16).

The second MANOVA included the TPB proper variables plus autonomous and controlled motivation as potential factors differentiating athletes who have used and have not used KT in the past year. The partial-eta squared value for autonomous motivation was 0.27 and the value for controlled motivation was 0.02 in this study. In this sample of athletes, those who reported using KT noted statistically higher autonomous motivations for tape use than those athletes who did not use KT. Also, it was found that controlled motivation did not differ statistically between athletes who have used KT and athletes who have not used KT in the past 12 months.

Theories provide a framework for research to understand and explain human behaviour in a variety of settings (Rothman, 2004). Ajzen (1991) indicates that according to TPB human behaviour is dependent upon an individual's attitudes, subjective norms, perceived behavioural control and their intentions to perform a behaviour. TPB is considered to be one of the most influential models for the prediction of human behaviour (Ajzen, 2011). Each of the constructs within the TPB has demonstrated theorized links

with an individual's behaviour (Rhodes, 2014). However, the relative contribution of these constructs allows the theory to be used in a variety of settings, and permits results to fluctuate depending on the setting (Rothman, 2004). For example, constructs central to the TPB can be used in a rehabilitation setting or to study injury prevention to understand an individual's behaviour. Researchers not only need to determine if theories are useful and applicable to a particular setting (e.g., rehabilitation), but they also need to determine if the relation between constructs within any theory (including TPB) can vary in different contexts (Rothman, 2004).

Testing theoretical principles across a diverse array of settings and populations enables researchers to specify the scope of a theory (Rothman, 2004). This study has provided evidence that supports use of the TPB in testing athletes frequency of using KT which is a novel application of Ajzen's (1991) assertions. Ajzen (1985) explains that in order for the TPB to predict behaviour, there must be differences between the constructs of attitudes, subjective norms and perceived behavioural control in order to predict intention to engage in a behaviour. It was found in this study that there were statistical differences between groups who used KT and never used KT. Therefore, it may be reasonable to speculate that the TPB was a suitable fit to examine athlete use of KT.

Another advantage of theories is they provide areas where interventions can be implemented to change a behaviour (Rothman, 2004). The conceptual and analytic frameworks that theories offer researchers can facilitate greater understanding of 'why' an intervention was effective or ineffective (Rothman, 2004). Therefore, in this study if changes were to be implemented in regard to KT behaviour, attitudes, subjective norms, perceived behavioural control and intentions should be targeted as potential

psychological factors that if altered may change this behaviour. In order to change behaviours, Ajzen (1971) explains that behavioural interventions must try to change the beliefs that guide the performance of the behaviour. Ajzen (1971) claims that it is easier to produce change by introducing information that is designed to lead to the formation of new beliefs than to change existing beliefs. However, Ajzen (1971) notes that the intervention will be ineffective unless the individual is capable of carrying out their newly formed intention.

The data from this sample of athletes is consistent with Ajzen's (1991) contentions because those who have used KT reported higher subjective norms, attitudes, perceived behavioural control and intentions. Vallance, Courneya, Plotnikoff, and Mackey (2008) used the TPB to differentiate between two groups of breast cancer survivors who either received standard public health (SR) recommendations for physical activity or one of two TPB-based behaviour change interventions (INT). When comparing the groups, Vallance et al. (2008) discovered that the intervention group reported positive changes in the TPB constructs when compared to the SR group. These findings are also consistent with Ajzen (1991) because in order for TPB to predict behaviour there should be differences among the constructs tested. The differences found between the two groups in the study by Vallance et al. (2008) provides support for the use of TPB. Also, the study by Vallance et al. (2008) does not use the TPB in the same setting as Project K.T.A.P.E. and it uses intervention methods unlike Project K.T.A.P.E. However, findings can still be compared from the study by Vallance et al. (2008) to this study because they both examined the differences between two groups on the TPB constructs. Researchers in both studies found that one group scored higher on TPB

constructs; in this study, it was the group who used KT in the past 12 months and in the study by Vallance et al. (2008) it was the intervention group. This is important because it provides evidence to support that the TPB proper can be used to differentiate behaviours in individuals.

Previous studies using the TPB have examined this approach in various settings including a rehabilitation. Niven et al. (2012) used the TPB to predict rehabilitation intention adherence after ACL surgery in 87 patients. After examining the patients over an eight-week period it was revealed that participants scored higher on the TPB variables, with strong intentions to adhere, a positive attitude towards rehabilitation, high perceptions of support from significant others and perceptions of control over the rehabilitation and the confidence that rehabilitation could be undertaken (Niven et al., 2012). The study by Niven et al. (2012) provides support for the results of this study examining athlete's use of KT, because athletes who have used KT also scored high on attitudes, subjective norms and perceived behavioural control. Niven et al. (2012) provides evidence supporting the use of TPB in a rehabilitation setting which aligns with the findings from this study given that athletes reported using KT predominantly for 'rehabilitation' purposes. This is important because both studies are consistent with Ajzen (1991) in that higher scores on the TPB constructs helps to explain behaviours.

In addition to using the TPB proper variables, autonomous and controlled motives were also included in this study. Autonomous and controlled motives were taken from SDT which is a theory based on human motivation and focuses on autonomous and controlled motivation as mechanisms to explain and predict human behaviour and well-being (Deci & Ryan, 2008). Findings of this study are consistent with the main focus of

the SDT in regard to autonomous motivation predicting behaviour (Deci & Ryan, 2008). It was noted that autonomous motivation was able to differentiate behaviour in the group who used KT compared to the group who never used KT. However, controlled motivation was found to have no effect on group differentiation based on KT use. The results pertaining to controlled motivation do not align well with SDT (Deci & Ryan, 2008) given there was no effect attributed to controlling motives on the use of KT between groups. Nevertheless, findings can provide support for the construct of autonomous motivation of the SDT to be incorporated in a setting examining athletes use of modalities in sport.

Previous research has provided evidence toward the integration of the TPB with key elements of SDT. Chan and Hagger (2012a) examined how theoretical integration can offer an effective model to help explain sport injury prevention. TPB and SDT were combined to maximize the strengths and, compensate for weaknesses evident in both theories (Chan & Hagger, 2012a). Chan and Hagger (2012a) found that autonomous motivation from SDT exerted significant effects on attitude, subjective norm, perceived behavioural control and intention from TPB. The integrated model of SDT and TPB also received support within injury prevention contexts including elite sport and occupational contexts (Chan & Hagger, 2012a; Chan & Hagger 2012b; Chan et al., 2011). Therefore, the findings reported in this study support the TPB constructs, but also the construct of autonomous motivation from the SDT are also supported by these findings. Controlled motivation cannot be supported by this study because there was no effect on either of the groups who used KT or did not use KT in the past 12 months. Supporting the use of an

integrated model of TPB and SDT is important as researchers aim to specify and refine the scope of a theory (Rothman, 2004).

Project K.T.A.P.E. is not the first study to question the importance of controlled motives in athletes. A previous study by Chan et al., (2011) examining relationships between sport motivation, treatment motivation and autonomy support in recreational and competitive athletes. They employed the trans-contextual model (TCM) and measured sport motivation, autonomy support from physiotherapists and treatment motivation (Chan et al., 2011). Chan et al. (2011) noted that controlled motivation for sport injury rehabilitation was not a significant predictor of treatment intention in their study of recreational and professional athletes. Findings of Chan et al. (2011) can be supported by this study, as both studies found that controlled motivation did not have a statistical effect in relation to athlete's behaviour. Since the study by Chan et al. (2011) and this study examined controlled motivation in a sports setting, it may provide evidence that controlled motivation does not influence behaviour undertaken by recreational or competitive athletes engaged in sport. Therefore, it is possible to speculate that in the context of understanding KT behaviour among athletes, controlled motivation may not be a significant construct to examine.

Kinesiology Tape: Prevalence Rates in Athletes

A secondary purpose of this study was to determine the prevalence of KT use among recreational and competitive athletes. Data reported by the sample in this study found that approximately half of the sample (49.60%) responded that they have used KT in the past 12 months. Frequency of KT use varied considerably in this sample with

23.60% of athletes reporting using KT at least two or three times a month, one or two times a week or at least three times a week.

The results concerning prevalence of KT use in athletes can be linked to previous research. For example, Venter et al. (2010) examined the recovery modalities used by elite South African athletes. Each recovery modality was placed into four categories: (a) natural strategies (e.g. nutrition, sleep, etc.), (b) physical strategies (e.g., thermotherapy, massage, etc.), (c) psychological strategies (e.g., imagery, music, etc.) and (d) alternative medicine strategies (e.g., acupuncture, etc.). A total of 890 South African athletes participated in the study. Venter et al. (2010) noted that the most common recovery modality reported was use of an active cool-down (e.g., physical strategy), while all other recovery modalities were not used regularly by these athletes. Venter et al. (2010) state that there is an impression that players use these recovery modalities extensively, however, they established in this study that this is not the case. Venter et al. (2010) found that 43% of athletes reported they used massage therapy as a physical strategy, and 29% of athletes used progressive muscle relaxation. Therefore, Venter et al. (2010) gives insight into the frequency of use of recovery modalities used by elite South African athletes.

The importance of the findings of Venter et al. (2010) relate to this study in several ways, although direct comparisons should be made cautiously because each study uses athletes competing at different levels of sport, in different countries, and using different treatment modalities. Both, this study and Venter et al. (2010) examine potential treatment modalities used by athletes competing in sport. However, KT was not examined in the study reported by Venter et al. (2010) and it is noted that KT has multiple

uses including treatment modality, injury prevention and performance enhancement. As such, the results of this study extend those reported by Venter et al. (2010) to document the prevalence of using another potential treatment modality by athletes. Second, Venter et al. (2010) examined the frequency that athletes use different (n = 4) treatment modalities. It is worth noting that similarities are evident in the frequency of KT use reported in this study and the frequencies of modalities reported by Venter et al. (2010) using non-KT modalities. For example, in the study by Venter et al. (2010) massage therapy was reported by 43% of athletes, and this study established that almost 50.00% of the sample reported using KT in the past 12 months. Given the lack of available literature examining frequency of using various modalities (such as KT), this study could serve as a benchmark for future studies and research that examine frequency of modality usage among athletes.

Likewise, athletes use a variety of medications such as NSAIDs to treat injuries or obtain a competitive advantage (Alaranta et al., 2006). Alaranta et al. (2006) assessed the frequency of use of medications in a sample of Finnish elite athletes compared to a representative sample of young adults of the same age, participants had a mean age of 23.00 years and a standard deviation of 4.50 years. Participants included 494 athletes and 1503 individuals from the general population (Alaranta et al., 2006). After age-matching the sample of athletes to the general population, Alaranta et al. (2006) found that NSAIDs were used by 49.1% of the athletes during the previous 12 months. Alaranta et al. (2006) also concluded that athletes use significantly more NSAIDs than the general population. The study by Alaranta et al. (2006) can be compared with the findings reported in this study with caution because athletes were participating at different levels of sport, and

from different countries. However, it seems that the frequency of using NSAIDs among the elite Finnish athletes (49.10%) and KT users among the recreational and competitive athletes providing data for Project K.T.A.P.E. (49.60 %) have similar prevalence rates.

A study by Krause et al. (2017) examined prevalence rates of KT among exercise science students enrolled in a German university. They found that two-thirds of their sample reported using KT (Krause et al., 2017). It should be noted that the sample of athletes studied by Krause et al. (2017) differ from those enrolled in Project K.T.A.P.E. in various ways – including the country where data collection occurred - which could make direct comparison of the results between these studies challenging. However, findings from Project K.T.A.P.E. and Krause et al. (2017) demonstrate that KT is popular among the participants sampled in both studies. These findings can provide an understanding into the prevalence rates of athletes using various modalities to rehabilitate, or gain a competitive advantage in their perspective sports.

Kinesiology Tape: Why do athletes use it?

Another secondary purpose of this study was to examine the reasons athletes provide for using KT. In this study, 37.00% of the athletes reported using KT for 'rehabilitation' purposes and 18.90% used KT as a 'performance aid'. Also 39.30% of athletes reported using KT 'after an injury' with athletes reporting that they used KT after an injury 'often' or 'sometimes' more than any other option provided. This means that over a third of this sample used KT for the purpose of 'rehabilitation'. These findings may not be too surprising given that KT seems to have been increasing in popularity since 2008 (Csapo & Alegre, 2015), and multiple studies in the literature have examined the use of KT for the express purposes of 'rehabilitation'.

In this study, 37.00% of athletes reported using KT for ‘rehabilitation’ purposes, which was more than any other reason provided by this sample. Many studies in the relevant literature have demonstrated the use of KT for training injured athletes. One systematic review and meta-analysis published by Montalvo et al. (2014) analyzed thirteen articles focused on the effects of KT on pain associated with musculoskeletal injuries. Montalvo et al. (2014) demonstrated that there is insufficient evidence to substantiate any therapeutic effects of KT and concluded that pain reduction from musculoskeletal injuries did not differ between users of KT compared with other treatment modalities. Given that the data reviewed by Montalvo et al. (2014) focused on the context of rehabilitation after an injury, it aligns with the current study given that a popular option reported for KT use was rehabilitation. Other studies have also examined the utility of KT as a therapeutic rehabilitation modality. For example, Krause et al. (2017) while examining prevalence rates, also looked at the reasons reported for using KT in athletes enrolled at a German university. They found that 60.50% of the sample applied KT as a therapeutic measure in musculoskeletal complaints, followed by 25.50% of the sample who reported using KT for re-injury prevention (Krause et al., 2017). Therefore, it is not surprising that ‘rehabilitation’ was the main reason athletes in Project K.T.A.P.E. reported using KT.

Due to the lack of evidence supporting the use of KT as a recovery modality to rehabilitate injury in athletes, health professionals should be cautious in deciding what kinds of treatment modalities to recommend for athletes. Even though using KT for rehabilitation may be the most popular reason cited among athletes in this study, it does not mean KT is an injury rehabilitation technique supported by empirical evidence for

athletes to use (see Montalvo et al., 2014, for further details). Health professionals treating injured athletes or designing programs to enhance performance of athletes should be wary of using modalities that lack evidence to support their effectiveness in the research literature such as using (or possibly abusing) KT.

Limitations

Scientific research is not without limitations and this research study is no exception. There are five main limitations of this research that should be considered when interpreting the findings. First, this study used a non-experimental, cross-sectional study research design. Trochim (2006) summarizes issues pertaining to non-experimental (cross-sectional) designs including prohibiting the ability to make claims of cause and effect. This limitation could be addressed by using a longitudinal research design where participants are monitored over multiple time periods on their use of KT.

Second, this study uses a non-probability (purposive) sampling method. Non-probability samples may (or may not) represent any target population (Trochim, 2006). This limitation could be addressed by using another form of sampling (such as probability-based sampling techniques drawing from a 'known' population) that confer greater confidence in the generalizability of study observations by randomly sampling from a well-defined target population (e.g., professional athletes).

Third, this study was limited to collecting data from participants at Brock University. If a larger population was accessible (e.g., athletes on university sports teams across Canada) it is possible that the data from Project K.T.A.P.E. would have been different. This limitation could be addressed by getting ethical clearance at each

university across Ontario (or Canada) to contact potential participants who have used or not used KT.

Fourth, this study relied exclusively on self-report data. Self-report data has been criticized in the literature for issues such as construct validity, wording of questions and order of items used to generate this type of data (Chan, 2009). This limitation could be addressed by using data collection methods that do not require self-report mechanisms to rule out potential biases in the sample data that effect interpretability.

Lastly, a challenge of this study was measuring prevalence rates of KT among this sample. This was challenging as it was a difficult concept to define and measure, therefore it could have led to over-estimates or under-estimates of prevalence in this sample. This limitation could be addressed by developing or using a data collection method that is more accurate to measure prevalence rates of KT so interpretations of the data can be more valid.

Summary

In conclusion, findings of this investigation suggest that athletes who use KT report higher subjective norms, perceived behavioural control, attitudes, intentions, and autonomous motivation for use of this modality. The secondary findings of this study suggest that KT is popular among competitive/recreational athletes with almost half of the sample using it in the last 12 months. As well, it was noted that athletes used KT for rehabilitation more so than for prevention of injury or as an aid to improve sport performance. These results can support future research by using the prevalence of KT reported here as a benchmark to compare against other modalities used by athletes. It can also support health professionals working directly with athletes who are treating injuries,

preventing injuries, or enhancing an athlete's performance using KT. Since athletes who have used KT reported higher scores on all variables except for controlled motivation, health professionals working with these individuals can use these psychological variables to gain an advanced understanding of the effect of KT on an athlete. This study provides deeper insight into the psychological variables that are expressed to a greater degree by those athletes who have used KT compared to those who have not. Overall, it appears that the extended TPB (including only autonomous motives from SDT; Deci & Ryan, 2008) provides a useful framework to understand KT use in athletes and further research using this approach seems justified.

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Tables

Table 1

Characteristics of Participants enrolled in Project K.T.A.P.E.

Study Variables	*M* (± *SD*) or %		
	Total Sample	Used KT	Not Used KT
Age	20.84(±2.77)	20.97 (±3.37)	20.72 (±2.03)
Sex			
Male	38.10	38.70	37.50
Female	61.90	61.30	62.50
Ethnicity			
White	84.30	88.90	79.70
South Asian	3.10	1.60	6.30
Chinese	2.40		4.70
Black	2.40	1.60	3.10
Aboriginal	0.80	0.00	1.60
Southeast Asian	0.80	1.60	0.00
Other	6.30	7.90	4.70
Level of Sport			
Competitive	52.80	65.10	40.60
Recreational	37.80	30.20	45.30
Injury past 12 months			
Yes	59.10	74.60	43.80
No	40.90	25.40	56.30

Note. M = mean scores. *SD* = Standard Deviations. % = Percent.

Table 2

Cronbach's alpha reliability scores for TPB and motivation variables

Variable	Group 1 (α)	Group 2 (α)
Subjective Norms (1-7)	0.69	0.67
Perceived Behavioural Control (1-7)	0.84	0.78
Attitudes (1-7)	0.92	0.92
Intention (1-7)	0.88	0.88
Autonomous Motivation (1-7)	0.82	0.93
Controlled Motivation (1-7)	0.89	0.85

Note. Cronbach's alpha is illustrated using the α symbol. Group 1 consists of individuals who have never used KT (n = 64), Group 2 consists of individuals who have used KT (n = 63).

Table 3

Means and standard deviations for variables in the extended TPB framework

Study Variables	*Group 1*		*Group 2*	
	M	*SD*	*M*	*SD*
Subjective Norms	3.18	1.15	4.27	1.38
Perceived Behavioural Control	4.94	1.21	5.82	1.14
Attitudes	4.22	1.14	5.60	1.08
Intention	3.23	1.41	4.06	1.44
Autonomous Motivation	2.43	1.41	4.06	1.26
Controlled Motivation	1.57	0.93	1.88	1.30

Note. Group 1 consists of individuals who have never used KT (n = 64), Group 2 consists of individuals who have used KT (n = 63), M = mean scores. SD = Standard Deviation.

Appendices

Appendix A:

Study Questionnaire

Instructions:
The following survey is comprised of questions that ask you about your use of, and beliefs about, Kinesiology Tape. Kinesiology Tape consists of tightly woven elastic fibres that can be used to aid injury prevention, injury recovery, or athletic performance.
There are no right or wrong answers to these questions so please respond as openly and honestly as possible to each question. All of your responses will remain anonymous and confidential and shall not be disclosed to others in any way that identifies you.
Thank you for participating in this research study.

Section 1: Demographics

The first part of the questionnaire is designed to describe the people who participate in this study. All information is held in confidence.

Age: _____(years)

What is your sex?
❑ Male ❑ Female

How would you describe your ethnic origin?

❑	White	❑	South Asian	❑	Chinese
❑	Black	❑	Filipino	❑	Arab
❑	Korean	❑	Latin American	❑	West Asian
❑	Japanese	❑	Aboriginal	❑	Southeast Asian
❑	Other - Specify: _____				

Section 2: Sport Participation and KT History

The following questions identify your previous injuries and your use of Kinesiology Tape (KT) in the past 12 months. Please answer to the best of your abilities.

What level of sport have you played in the last 12 months?
❑ Recreational (Intramural, House League)
❑ Competitive (University/CIS, Club/Travel, Professional)
❑ I have not played recreational/competitive sport in the last 12 months

What sport(s) have you played in the past 12 months?

Have you been injured from a sport in the past 12 months?
❑ Yes ❑ No

Have you used kinesiology tape in the past 12 months?
❑ Yes ❑ No

In the past 12 months, have you used kinesiology tape for any of these reasons?
❑ Injury Prevention ❑ Injury Rehabilitation
❑ Performance Aid ❑ Other

How often have you used KT after suffering an injury in the last 12 months?
❑ Never ❑ Less than once a month
❑ About once a month ❑ Two or three times a month
❑ One or two times a week ❑ At least 3 times a week

The following questions include, but are not limited to, the past 12 months. Please answer each of the following questions with this time frame in mind:

Previously, how often have you used kinesiology tape for a sports injury?
❑ Never
❑ Rarely
❑ Sometimes
❑ Often
❑Always

In the past, why have you used kinesiology tape when playing sport?
❑ Injury Prevention ❑ Injury Rehabilitation
❑ Performance Aid ❑ Other

Previously have you used kinesiology tape for any reason other than playing sport?
❑ Yes ❑ No

If yes, please explain why you have used kinesiology tape in the space provided:

In the future, how often will you use kinesiology tape?
❑ Never
❑ Rarely
❑ Sometimes
❑ Often
❑Always

Previously, how often have you used kinesiology tape?
❑ Never ❑ Less than once a month
❑ About once a month ❑ Two or three times a month
❑ One or two times a week ❑ At least 3 times a week

Section 3: Kinesiology Tape Beliefs

The following questions identify different beliefs that are held by the Theory of Planned Behaviour towards KT use. Please indicate on the scale provided if you agree or disagree with the following statements, with 1-strongly agree, 4-neutral and 7-strongly disagree.

	Strongly Agree			**Neutral**			**Strongly Disagree**
1.I intend to use KT when I get injured	1	2	3	4	5	6	7
2.I will try to put effort into using KT when I get injured	1	2	3	4	5	6	7
3. I plan to use KT when I get injured	1	2	3	4	5	6	7
4. Most people who are important to me think that I should use KT when I get injured	1	2	3	4	5	6	7
5. It is expected of me that I use KT when I get injured	1	2	3	4	5	6	7
6. The people in my life whose opinions I value would approve of me using KT when I get injured	1	2	3	4	5	6	7
7. It is possible for me to follow the recommendations to use KT when I get injured	1	2	3	4	5	6	7
8. If I want to I could use KT when I get injured	1	2	3	4	5	6	7
9. I have complete control over the use of KT when I get injured	1	2	3	4	5	6	7
10. It is mostly up to me to use KT when I get injured	1	2	3	4	5	6	7
11. It is easy for me to use KT when I get injured	1	2	3	4	5	6	7
12. My attitude towards KT when I have an injury is:	Worthless						Valuable
	1	2	3	4	5	6	7
	Harmful						Beneficial
	1	2	3	4	5	6	7
	Unpleasant						Pleasant
	1	2	3	4	5	6	7
	Unenjoyable						Enjoyable
	1	2	3	4	5	6	7
	Bad						Good
	1	2	3	4	5	6	7
	Not virtuous						Virtuous
	1	2	3	4	5	6	7

Section 4: Motives to use KT

The following questions identifies motives of athletes to use or not use KT. Please indicate on the scale provided how true each statement is for you with 1-not true, 4-somewhat true and 7-very true.

	Not at all true			**Somewhat True**			**Very true**
A.I have decided to use KT when I am injured because:							
1.I would have felt bad about myself if I didn't	1	2	3	4	5	6	7
2. Others would have been angry at me if I didn't	1	2	3	4	5	6	7
3. I would have felt like a failure if I didn't	1	2	3	4	5	6	7
4. I feel like it's the best way to help myself	1	2	3	4	5	6	7
5. People would think I'm a weak person if I didn't	1	2	3	4	5	6	7
6. I have chosen to use KT	1	2	3	4	5	6	7
7. I have invested a lot of time into my injury rehabilitation process	1	2	3	4	5	6	7
B. I have followed the recommendations to use KT when I am injured because:							
8. I believe KT will help me solve my problem	1	2	3	4	5	6	7
9. I have been worried that I will get in trouble if I don't use KT	1	2	3	4	5	6	7
10. I want others to see that I am really trying to recover	1	2	3	4	5	6	7
11. It is important to me that my efforts succeed	1	2	3	4	5	6	7
12. I feel guilty if I don't use KT	1	2	3	4	5	6	7

Thank you for taking the time to participate in our research study. If you have any questions pertaining to the research study or the data, you provided please do not hesitate to ask a member of our research team at any time.

Appendix B:

Recruitment Poster

Project K.T.A.P.E.

Kinesiology Tape For Athlete Performance

Brock University

Purpose: *To examine use of and beliefs about, Kinesiology Tape by athletes*

Study Requirements: *Complete a short questionnaire (15-20 minutes) using an encrypted website*

For more information, contact:

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Interested participants can also access the study website for further information: www.surveymonkey.com/r/PROJECTKTAPE

This study has been reviewed and received ethics clearance from the Brock Universtiy Research Ethics Board (File #16-089).

Brock University 50 1964-2014 Faculty of Applied Health Sciences Department of Kinesiology

Behavioural Health Sciences Research Lab

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Appendix C:

Verbal Presentation Script

Hello, my name is Sydney Santin and I am a Graduate Student in the Faculty of Applied Health Sciences at Brock University where I am pursuing my master's degree under the guidance of Dr. Philip M. Wilson (Co-Director of the Behavioral Health Sciences Research Lab). I am here today to present a project that we are currently recruiting participants for entitled "Project KTAPE: Kinesiology Tape for Athlete Performance". I am the principal Student Investigator for Project KTAPE.

I am studying a new form of performance tape called Kinesiology Tape (KT). KT is a brightly coloured elastic tape that stretches to 120% of its original size, and claims to increase muscle function and reduce pain. This research is designed to help us understand more about why athletes use or do not use KT. If you volunteer as a participant in this study, you will be asked to complete a series of questions in a survey designed specifically for this research project. The questions contained within the survey will ask about your level of sport participation, and your beliefs regarding KT, as well as demographic questions like age. Your involvement should take no longer than 15-20 minutes on a single occasion. Your participation is voluntary and all of the information that you provide will remain confidential. This means that we will not be sharing your personal data with any other person or party in such a manner that you could be identified as a consequence of participating in this study. As a participant you will have the opportunity to be entered into a random prize draw for one of ten, $10.00 Tim Hortons gift cards.

If you are interested in participating, please log into the following website for further details:

www.surveymonkey.com/r/PROJECTKTAPE

This study has been reviewed and received ethics clearance from the Brock University Research Ethics Board (File #16-089).

Appendix D:

Electronic Presentation Script to Professors

Good Afternoon (insert professors name here),

My name is **Sydney Santin** and I am a graduate student in the Faculty of Applied Health Sciences at Brock University. I am conducting a research study entitled 'Project K.T.A.P.E: Kinesiology Tape for Athlete Performance' for my Master's thesis under the supervision of **Dr. Philip M. Wilson** (Department of Kinesiology, Brock University). Briefly, this research study is designed to address the following questions: (a) How often is kinesiology tape used by athletes? And (b) Why do athletes use kinesiology tape in sport?

I am writing to request your assistance in advertising this research study to the students in your class (insert course code here) who may be interested in participating. I am writing to ask if you would allow me to present my study during one of your classes. My speech is less than 5 minutes in length, and I have one slide that I would like to put up on the screen. I can send you my speech and slide ahead of time. I will be available at your convenience to come in to speak with your students if you will allow me.

I am also writing to ask if you would place an announcement on Sakai for your courses that advertises this research study. If you are willing to post a message advertising this study to your course site on Sakai, please email me and I will send you a copy of the script to be posted that is being used for this study.

You are welcome to contact me if you have any questions about this research study or my request for your assistance in participant recruitment.

Thank you very much for your time,

Sydney Santin, BKin

This study has been reviewed and received ethics clearance from Brock University Research Ethics Board (File #16-089)

Appendix E:

Electronic Presentation Script to Coaches

Good Morning/Evening <insert name of coach about here>

My name is Sydney Santin and I am a graduate student in the Faculty of Applied Health Sciences at Brock University conducting a research study for my thesis entitled 'Project K.T.A.P.E.: Kinesiology Tape for Athlete Performance'. Briefly, this research study is designed to address the following questions: (a) How frequently is kinesiology tape used by athletes? and (b) Why do athlete use kinesiology tape in sport?

I am requesting your assistance in advertising this research study to your athletes who may be interested in participating. If possible, please forward the information below to your athletes. You are welcome to contact me if you have any questions about this research study.

Thank you very much for your time,
Sydney Santin, BKin
This study has been reviewed and received ethics clearance from the Brock University Research Ethics Board (File #16-089).

Athletes ,

My name is Sydney Santin and I am a graduate student at Brock University in St. Catharines, Ontario, Canada. I am conducting a research study entitled "Project KTAPE: Kinesiology Tape for Athlete Performance" designed to further our understanding of athlete's beliefs towards, and use of, kinesiology tape when engaged in sport. I would like to invite all athletes who are interested in this research study to participate.
Your participation in this study will involve completing a series of questions using an online survey designed specifically for this study. It is expected that your total involvement in this research study would take no longer than 15-20 minutes of your time. Your participating is voluntary and all of the information that you provide will remain confidential. This means that we will not be sharing your personal information with any other person or party in such a manner that you could be identified as a consequence of participating in this study. As a participant you will have the opportunity to be entered into a random prize draw for one of ten, $10.00 Tim Hortons gift cards.

If you wish to participate in the study, or would like more detailed information, please click on the following link:

www.surveymonkey.com/r/PROJECTKTAPE

Please direct any questions or concerns about this study to either Sydney A. Santin (ss10qy@brocku.ca) or Dr. Philip M. Wilson (pwilson4@brocku.ca) both within the Behavioral Health Sciences Research Lab at Brock University (St Catharines, ON). Thank you for your time and consideration of our research study.

Appendix F:

Facebook Post

Brock University Faculty of Applied Health Sciences

February 1 ·

Applied Health Sciences grad student, Sydney Santin wants to know what athletes think about kinesiology tape. Learn more >>
www.surveymonkey.com/r/PROJECTKTAPE

Project K.T.A.P.E.

(Kinesiology Tape and Athlete Performance).

Researchers from the Behavioral Health Sciences Research Lab at Brock University are conducting a new study focused on athletes' use of, and beliefs about, kinesiology tape. Kinesiology tape is a highly visible, brightly colored, type of elastic sports/fitness tape. Interested in participating? Click on the link below if you are 17 years of age (or older) to learn more about Project K.T.A.P.E.
www.surveymonkey.com/r/PROJECTKTAPE

This study has been reviewed and received ethics clearance from the Brock University Research Ethics Board (File #16-089).Choosing to interact with this posting in any way (e.g., "liking", sharing, etc.) may impact your anonymity with regards to Project K.T.A.P.E.

Appendix G:

Sakai Script

Project K.T.A.P.E. (Kinesiology Tape and Athlete Performance).

The Behavioral Health Sciences Research Lab at Brock University is conducting a new study entitled Project K.T.A.P.E. (Kinesiology Tape and Athlete Performance). The purpose of the study is to understand how often athletes use kinesiology tape and the beliefs athletes express about use of kinesiology tape in sport. Kinesiology tape has become a popular feature in recreational and competitive sport yet little is known about how frequently this aid is used by athletes or what athletes think about using this approach to aid sport participation and performance.

We are posting this message to advertise our research study to recreational and competitive athletes (aged ≥ 17 years). Participation is voluntary and all data are provided anonymously and retained confidentially. Further details concerning Project K.T.A.P.E. can be found at the following website:

www.surveymonkey.com/r/PROJECTKTAPE

This study has been reviewed and received ethics clearance from the Brock University Research Ethics Board (File #16-089).

Appendix H:

Letter of Invitation

Date: <to be inserted here>

Letter of Invitation

Title of Study: Project K.T.A.P.E.: Kinesiology Tape for Athlete Performance
Principal Investigator: Dr. Philip M. Wilson, Associate Professor, Department of Kinesiology, Faculty of Applied Health Sciences, Brock University
Principal Student Investigator: Ms. Sydney A. Santin, BKin, Graduate Student, Faculty of Applied Health Sciences, Brock University

Dear Participant,

Introduction: Research led by Dr. Philip M. Wilson (Associate Professor) and Ms. Sydney A. Santin (Graduate Student) from the Behavioural Health Sciences Research Lab (BHSRL, Faculty of Applied Health Sciences, Brock University) are conducting a research study designed to advance our understanding of kinesiology tape use by athletes.

Purpose: The purpose of the research study is to address the following questions: How often do athletes use kinesiology tape? and What beliefs do athletes endorse about kinesiology tape?

Involvement: Should you choose to participate you will be asked to complete a survey designed for this research study. An example of a question from the survey for this research study is: "Have you been injured in the past 12 months where you have used kinesiology tape as a form of treatment?". You will be asked to provide your responses to the questions contained within the survey using an encrypted website designed specifically for this study on a single occasion. It is expected that your participation in this research study should take no longer than 15-20 minutes of your time.

Benefits: There are a number of benefits associated with participating in this research study. Each participant has the option to be entered into a random draw for 1 of 10 Tim Hortons Gift Cards (Value = $10 CAD). Withdrawing from the study at any time does not preclude a participant from being entered into the random draw. Participants who withdraw and wish to have their name entered into the prize draw can request this option by emailing the study investigators. Additional benefits may include, but are not limited to, the following: (a) Greater understanding of the use of kinesiology tape by athletes, and (b) Opportunities to be involved in the research being conducted at Brock University. The study findings may be disseminated in academic journals and conference presentations in such a way that no participant is identified as a function of their involvement in this research study. Any information that is provided from participants will be treated as confidential and access to all information provided in this research study is restricted only to the Principal Investigator and Principal Student Investigator noted in this letter. All recorded data will be kept on an encrypted website accessible only to members of the research team. Consistent with guidelines that control the collection and storage of scientific information in Canada, all data collected for this study will ultimately be

destroyed.

Participation: Participation in this study is voluntary and you may decline to answer any question(s) you find invasive, offensive or inappropriate. There also may be risks associated with participation including questions that solicit information about your involvement in sport, experiences with sports injury and beliefs about kinesiology tape, which may invoke feelings of discomfort or anxiety for some participants because they are being asked to disclose personal information. You may choose to decline or withdraw your participation at any time throughout the course of the study and will not experience any negative consequences as a result of your decision. Once data that any participant submits as a function of their involvement in this research study is received by the investigators, the data cannot be removed from the research study because all data will be provided anonymously thereby including no personal identifiers. All summary reports emanating from this study will use data that does not identify any participant individually. It is important to note that the data you provide if you choose to participate in this study will be collected using an electronic interface (www.surveymonkey.com) that is based in the United States of America and therefore is subject to American Homeland Security laws such as the Patriot Act.

If you wish to participate in this study, please continue to the next page. If you have any questions about this research study, please feel free to contact either Dr. Wilson or Ms. Santin using contact details offered below:

Dr. Philip M. Wilson
E-mail: pwilson4@brocku.ca
Tel: 1 905 688 5550 Ext 4997

Ms. Sydney A. Santin, BKin
Email: ss10qy@brocku.ca
Tel: 1 905 688 5550 Ext 5564

If you have any questions about your rights as a research participant, please contact the Brock University Research Ethics Officer (905 688-5550 Ext. 3035, reb@brocku.ca). This study has been reviewed and received ethics clearance through Brock University's Research Ethics Board (File: 16-089).

Thank you for your interest and involvement in this study.

Sincerely,

Philip M. Wilson, PhD
Sydney Santin, BKin

Appendix I:

Letter of Informed Consent

INFORMED CONSENT

Project Title: Project K.T.A.P.E.: Kinesiology Tape for Athlete Performance
Principal Investigator (PI): Dr. Philip M. Wilson, Associate Professor
Department of Kinesiology
Brock University
(905) 688-5550 ext. 4997; pwilson4@brocku.ca
Student Principal investigator (SPI): Sydney Santin, BKin,
Graduate Student Faculty of Applied Health Sciences
Brock University
(905)688-5550 ext. 5564; ss10qy@brocku.ca

INVITATION

You are invited to participate in a study that involves research. The purpose of the research study is to address the following questions: How often do athletes use kinesiology tape?, and What beliefs do athletes endorse about kinesiology tape?

WHAT'S INVOLVED

As a participant, you will be asked to complete a series of items on a single occasion within a survey about your use of kinesiology tape and your beliefs pertaining to kinesiology tape use. The survey is housed on an encrypted website designed exclusively for this research study. Participation will take approximately 15-20 minutes of your time.

POTENTIAL BENEFITS AND RISKS

Possible benefits of participation include being entered into a random draw for 1 of 10 Tim Hortons Gift Cards (Value = $10 CAD). Withdrawing from the study at any time does not preclude a participant from being entered into the random draw. Participants who withdraw and wish to have their name entered into the prize draw can request this option by emailing the study investigators. Additional benefits may include, but are not limited to, the following: (a) Greater understanding of the use of kinesiology tape by athletes, and (b) Opportunities to be involved in the research being conducted at Brock University. There also may be risks associated with participation including questions that solicit information about your involvement in sport, experiences with sports injury and beliefs about kinesiology tape, which may invoke
feelings of discomfort or anxiety for some participants because they are being asked to disclose personal information. It is important to note that the data you provide if you choose to participate in this study will be collected using an electronic interface (www.surveymonkey.com) that is based in the United States of America and therefore is subject to American Homeland Security laws such as the Patriot Act. All recorded data will be kept on an encrypted website accessible only to members of the research team. Consistent with guidelines that control the collection and storage of scientific information in Canada, all data collected for this study will ultimately be destroyed. All data will be secured until summary findings have been published and any/all feedback requested from

participants has been completed.

CONFIDENTIALITY

All data collected in this study will be anonymous. Participants will not have any personal identifiers linked to data collected as a function of the study. Names and contact information may be provided if participants wish to receive aggregate feedback pertaining to the results of the study or be entered into the random prize draw. Data collected during this study will be stored on a password protected server for the duration of the study. All data will be secured according to the guidelines set forth by the Tri-Council Policy Statement-2: Ethical Conduct for Research Involving Humans (2014). Any printed materials (e.g., the list of participants requesting feedback and/or entered to win the prize draw) will be destroyed using a paper shredder upon completion of the study and announcement of the prize winners. Access to this data will be restricted to those involved in the study, exclusively the principal investigator (Dr. Philip M. Wilson) and the principal student investigator (Sydney Santin).

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled. Voluntary withdrawal from the study does not preclude access to the random draw for one of the Tim Horton's Gift Cards. However, once any participant submits their responses to the survey items to the study investigators, their data cannot be removed from the study because the data are anonymous and unidentifiable.

PUBLICATION OF RESULTS

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available once all data has been collected and analyzed by the researchers. It is anticipated this may take 1-2 months to complete after the final set of participants have completed their involvement in this research study. Summary feedback will be sent to participants who provide their contact details in the Participant Debriefing Form used in Project KTAPE.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact Dr. Philip M. Wilson or Sydney A. Santin. Please retain a copy of this form for your records by printing this page before proceeding with this research study.

This study has been reviewed and received ethics clearance through the Research Ethics Board at Brock University (File: 16-089). If you have any questions or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 ext. 3035, reb@brocku.ca

Thank you for your assistance in this research study.

CONSENT FORM

I agree to participate in this study described above. I have made this decision based on the

information I have read in the Letter of Invitation and procedures used to secure Informed Consent. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future at any time. I understand that I may withdraw this consent at any time. Please click the box below stating that you agree with the information stated above and consent to participate in this research study.

- ❑ I consent to participate in this research study
- ❑ I do not consent to participate in this research study

Please consider printing a copy of this page for your records before proceeding.